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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/966,121
Filing Date: September 28, 2001
Appellant(s): WALACAVAGE ET AL ET AL.

Daniel H. Bliss (Reg. No. 32, 398)
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 17th day of October, 2008 appealing from the Office action mailed 14th day of May, 2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,442,441	Walacavage et al	7-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-19 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent No. 6, 442, 441 issued to Walacavage et al et al.

As per claim 1, Walacavage et al discloses a method of using transformational arrays to emulate model behavior for a programmable logic controller logical verification system, said method comprising the steps of:

constructing a mechanical model using a computer (such as ...*constructing a vehicle body of the motor vehicle, the control model...*(See: Col. 2 line 67 through Col. 3 line 2)....*instructing CAD tooling models associated with the creation of the control model….*;See: Col. 4 lines 36-39);

generating transformational arrays for the mechanical model by incrementally recording one position of each piece of geometry of the mechanical model moved through space over a period of time using the computer (such as *…the fixture design system will create a neutral control model definition that describes how four clamps need to be sequenced along with a hard tooled welder...control model is information that describes events, dependencies, and logical conditions that are used to drive line modeling…*See: Col. 3 lines 13-40);

viewing motion of the mechanical model in a motion viewer based on the transformational arrays using the computer (such as…*plays a line model by the line verification system wherein the line verification system is a viewing tool, which is driven by the control model (i.e. mechanical model) described the neutral control model files (i.e. transformational arrays)…the method then advances to diamond 34 and determine*

whether a good control model (i.e. mechanical model) exists… (See: Col. 3 lines 1-8, Col. 3 lines 52-65);

determining whether the motion of the mechanical model is acceptable (such as *determines whether a good control model exists...if the control model is not correct, the method returns to the source...if the control model is good or correct, the method advance...*;See: Col. 3 line 63 through Col. 4 line 7);

replicating the motion of the mechanical model by generating a PLC code for the motion of the mechanical model using the computer if the motion of the mechanical model was acceptable (such as *….if the control model is good or correct…then the method advances and automatically generates the PLC code with the virtual PLC code generator from the neutral control model files…the virtual PLC code generator will create PLC code…*; See: Col. 4 lines 6-17); and

using the accepted motion of the mechanical model to compare the behavior of the PLC code relative to the accepted motion by playing the PLC code with a PLC emulator (such as *…the validation is performed by having the virtual PLC generator instruct CAD tooling models associated with the creation of the control model (i.e. accepted motion of the mechanical model)…*; See: Col. 4 lines 30-52).

As per claim 2, Walacavage et al discloses a method as set forth in claim 1 wherein said step of constructing comprises using a mechanical tool design system to construct the mechanical model (such as….*the fixture design system will create a neutral control model ….*;See: Col. 3 lines 9-18).

As per claim 3, Walacavage et al discloses a method as set forth in claim 2 including the step of constructing an electromechanical model (such as…*workcell design system such as robots….*;See: Col. 3 lines 21-34).

As per claim 4, Walacavage et al discloses a method as set forth in claim 3 wherein said step of constructing the mechanical model includes binding the electromechanical model to the mechanical model (such as…*workcell design system writes to a neutral control model file for workcell models, incorporating information from the neutral control model file from the fixture design system...*;See: Col. 3 lines 23-34).

As per claim 5, Walacavage et al discloses a method as set forth in claim 4 wherein said step of constructing the electromechanical model comprises using a PLC logical verification system to construct the electromechanical model (See: Fig. 1 #18 and corresponding texts).

As per claim 6, Walacavage et al discloses a method as set forth in claim 1 wherein said step of generating transformational arrays comprises generating the transformational arrays based on computer aided design (CAD) geometries of the mechanical model (such as *…the fixture design system will create a neutral control model definition that describes how four clamps need to be sequenced along with a hard tooled welder...control model is information that describes events, dependencies, and logical conditions that are used to drive line modeling…*See: Col. 3 lines 13-40).

As per claim 7, Walacavage et al discloses a method as set forth in claim 6 including the step of exporting the mechanical model to a control system design system (See: Fig. 1, Fig. 2 #13a, 13b and corresponding texts).

As per claim 8, Walacavage et al discloses a method as set forth in claim 7 including the step of constructing a motion file based on the mechanical model and transformational arrays (such as…*plays a line model by the line verification system, which is driven by the control model described within the neutral control model files…*;See: Col. 3 lines 59-62).

As per claim 9, Walacavage et al discloses a method as set forth in claim 8 wherein said step of displaying further comprises playing the motion file by a motion player (such as…*Visline which is a motion player….*; See: Fig. 2 # 40 #42).

As per claim 10, Walacavage et al discloses a method as set forth in claim 8 including the step of returning to the mechanical tool design system if the motion of the mechanical model is not acceptable (such as…*if the control model not correct, the method return to the source of engineering data such as the fixture design system, and/or workcell design system to adjust the fixture/workcell …*;See: Col. 3 line 65 to Col. 4 line 2).

As per claim 11, Walacavage et al discloses a method of using transformational arrays to emulate model behavior for a programmable logic controller logical verification system, said method comprising the steps of:

constructing a mechanical model using a computer (such as ...*constructing a vehicle body of the motor vehicle, the control model...*(See: Col. 2 line 67 through Col. 3 line 2)....*instructing CAD tooling models associated with the creation of the control model….*;See: Col. 4 lines 36-39);

generating CAD transformational arrays for motion in the mechanical model by incrementally recording one position of each piece of geometry of the mechanical model moved through space over a period of time using the computer (such as *…the fixture design system will create a neutral control model definition that describes how four clamps need to be sequenced along with a hard tooled welder...control model is information that describes events, dependencies, and logical conditions that are used to drive line modeling…*See: Col. 3 lines 13-40);

constructing a motion file based on the mechanical model and the CAD transformational arrays using the computer (such as…*plays a line model by the line verification system, which is driven by the control model described within the neutral control model files…*;See: Col. 3 lines 59-62);

viewing the motion of the motion file in a motion viewer using the computer (such as…*plays a line model by the line verification system wherein the line verification system is a viewing tool, which is driven by the control model (i.e. mechanical model) described the neutral control model files (i.e. transformational arrays)…the method then advances to diamond 34 and determine whether a good control model (i.e. mechanical model) exists…* (See: Col. 3 lines 1-8, Col. 3 lines 52-65);

determining whether the motion of the mechanical model is acceptable (such as *determines whether a good control model exists...if the control model is not correct, the method returns to the source...if the control model is good or correct, the method advance...*;See: Col. 3 line 63 through Col. 4 line 7);

replicating the motion of the mechanical model with motion commands in a PLC code using the computer if the motion of the mechanical model was acceptable (such as *….if the control model is good or correct…then the method advances and automatically generates the PLC code with the virtual PLC code generator from the neutral control model files…the virtual PLC code generator will create PLC code…*;See: Col. 4 lines 6-17); and

using the accepted motion of the mechanical model to compare the behavior of the PLC code to the accepted motion by playing the PLC code with a PLC emulator (such as *…the validation is performed by having the virtual PLC generator instruct CAD tooling models associated with the creation of the control model (i.e. accepted motion of the mechanical model)…*; See: Col. 4 lines 30-52).

As per claims 12-19, the instant claims recite substantially same limitation as the above rejected claims 2-7, 9, and 10, and therefore rejected under the same rationale.

(10) Response to Argument

a. Applicants argued:

"Walacavage et al does not disclose **generating transformational arrays** for a mechanical model by incrementally recording one position of each piece of geometry of the mechanical model moved through space over a period of time using a computer" (Remarks, pg. 12 paragraph 1, pg. 13 paragraph 2, pg. 17 paragraph 2).

In response, the prior art of reference discloses:

...the fixture design system will ***create a neutral control model*** *(i.e. transformational array), (wherein the neutral control model file contains a description of interlocked events, which* ***defines the required dependencies, action and signals that are associated with sequences and cycling manufacturing tooling device*** *(See: Col. 2 lines 59-67)), definition that describes how four clamps need to be sequenced along with a hard tooled welder...that the control model is information that describes events, dependencies, and logical conditions…* (See: Col. 3 lines 9-18), then *...generates the PLC code with the virtual PLC code generator from the neutral control files (i.e. transformational arrays)...*(See: Col. 4 lines 9-11).

Further, applicant's specification (See: applicants specification pg. 11-20) states:

...the transformational arrays are ***movies of manipulation of individual components in the mechanical model*** *and are* ***generated with the mechanical tool design system 16****. These transformational arrays are then* ***associated with the particular piece of machine component,***

such as a clamp, throughout the life cycle of the design and verification system. *It should be appreciated that the motion of the mechanical model can*

Compare to prior art of reference (Walacavage et al, Col. 2 line 59 through Col. 3 line 8), which states:

...the neutral control model file (i.e. transformational arrays) contains a description of interlocked events, which defines the required dependencies, action and signals that are associated with sequences and cycling manufacturing tooling device (i.e. movies). *For example, in constructing a vehicle body of a motor vehicle,* ***the control model would have individual events that described when the condition were correct for a clamp (i.e. mechanical model) to open or close (i.e. motion or movies).*** *It should be appreciated that* ***control information from the neutral control model file can be readily passed from one manufacturing design system to another...***

Now the question is whether the prior art of reference teaches the generated transformation arrays for mechanical model is based on ***incrementally recording one position of each piece of geometry of the mechanical model moved through space over a period of time using a computer.***

The above limitation is inherent to the following teaching of the prior art of reference (Walacavage et al).

For example, Walacavage et al teaches:

…the neutral control model contains a description of ***interlocked events, action and signals that are associated with sequences and cycling manufacturing tooling device…*** *the control model would have individual events that described* ***when the condition where correct for a clamp to open or close...*** (See: Col. 2 line 62 through Col. 3 line 3).

This means, in order to have a condition or action of opening and closing of a clamp in the neutral control model file (i.e. transformational array), there must be an incremental recording of the mechanical model moved through space over a period of time (i.e. inherent to clamp to open or close). Otherwise, it will be difficult to add a robot or other flexible automations with the clamps without having the recording of the clamp moved through space over a period of time.

Or,

… For example, if a ***fixturing station has robots or flexible automation involved****, the* ***workcell design system will import the fixture and processing data defined*** *in the neutral control model file from the fixture design system,* ***allowing the user to add robots to interact with the fixture and clamps*** (See: Col. 3 lines 23-32).

In order to allow a user to add robots to interact with the fixture and clamps and to describe how the tooling should operate "as designed" or "as expected" condition, there must be an incremental recording of each piece of geometry of the robot, and clamp moved through space over a period of time. Otherwise, the model will not be operate as designed or as expected and then determination of operation of the model will be incorrect and therefore no PLC code will be generated according to the expected condition, or action.

b. **Applicants argued:**

"Walacavage et al does not disclose viewing motion of the mechanical model in a motion viewer based on the transformation arrays using the computer to determine whether the motion of the mechanical model is acceptable" (Remarks, pg. 12 paragraph 1, pg. 13 paragraph 2).

Walacavage et al discloses:

...plays a line model by the line verification system wherein the line verification system is a viewing tool, which is driven by the control model (i.e. mechanical model) described the neutral control model files (i.e. transformational arrays)…the method then advances to diamond 34 and determine whether a good control model exists... (See: Col. 3 lines 1-8, Col. 3 lines 52-65).

c. Applicants argued:

"Walacavage et al does not disclose replicating a motion of a mechanical model by generating a PLC code for the motion of the mechanical model using a computer if the motion of the mechanical model was acceptable and using the accepted motion of the mechanical model to compare the behavior of the PLC code relative to the accepted motion by playing the PLC code with a PLC emulator" (Remarks, pg. 12 paragraph 1, pg. 14 paragraph 2, pg. 18 pragraph 2 line 1 through pg. 19 paragraph 1 line 2).

In response, Walacavage et al clearly discloses the recited limitation as follows:...*after block 32, the method then advance to diamond 34 and determines whether a good control model control exists...* *(See: Col. 3 lines 63-65)*...*in diamond 34, if the control model is good or correct, the method advance to block 36 and reads the neutral control model files by a "virtual programmable logic control" code generator 15…the method advances to block 38 and automatically generates the PLC code with the virtual PLC code generator from the neutral control model files...* (See: Col. 4 lines 6-17),

Then,

...*then the method advance to block 42 and instruct the line verification system by the virtual PLC generator based on the PLC code…and plays line model by the line verification system, which is driven by the PLC generated*

by the virtual PLC generator to analytically verify the PLC code...(See: Col. 4 lines 30-49).

d. **Applicants argued:**

"In Walacavage et al, there is a special purpose viewer or motion player, such as Visline in block 40, but there is **no** additional PLC emulator to play the PLC code such that the user can observe the motion of mechanical model using the actual PLC code as if they were watching a machine or manufacturing line of a vehicle assembly plant floor" (See: Remark pg. 14 paragraph 2 lines 5-8, pg. 19 paragraph 1 lines 3-6).

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., *the user can observe the motion of mechanical model using the actual PLC code as if they were watching a machine or manufacturing line of a vehicle assembly plant floor*) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In light of applicant specification (See: applicant specification, pg. 14 lines 11-14), PLC emulator is not used other than to play and visualize the PLC code. In this case, the prior art of reference (Walacavage et al) discloses a line verification system wherein the line verification system is a viewing tool (See:

Col. 3 lines 47-48) that includes a Visline to play and visualize the PLC code

(See: Col. 4 lines 32-49, Fig. 2 #40 and 42) as claimed invention.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Kibrom K Gebresilassie/

Examiner, Art Unit 2128

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